in writing, carelessness, those due to brain lesions or other structural changes, there remains a definite group of specific handwriting difficulties, frequently unrecognized as such in school children. This may exist in rare cases as an isolated defect, but is more frequently found in developmental alexia, the strephosymbolia (or twisted symbols) of Orton, in which spelling and writing are likewise affected, to even a greater degree than reading, because recognition is easier than recall. A sample of handwriting, therefore, may lead to the diagnosis of developmental alexia. The writing of these children is fairly characteristic in the reversals of words and letters, especially the letters *d* and *b*, *p* and *q*. They frequently show other evidences of mirror reading and writing. Children with this hindrance find it exceedingly difficult or impossible to learn to read by the flash-card method, as opposed to the phonetic system; instruction in the latter method often aids greatly in their ability to read as well as to write. Individuals who are dominantly left-handed should not be forced to write right-handed, and when left-handedness exists as a biological deviation in the nature of a regressive character, especially when accompanied by other such signs, the handicap imposed on these children by switching, even when they are not markedly left-handed, is such that they cannot readily adapt, and they may develop psychoneurotic reactions, including stuttering.

❋

JOSEPH CATTON, M.D. (490 Post Street, San Francisco). Neurological, psychological, and psychiatric studies of handwriting will always be important. I share Doctor Eaton's chagrin that so little authoritative work has been reported in the literature, both here and abroad. Doctor Eaton's paper concerns itself with those aspects of handwriting where one's feet may be kept on the ground; it deals with factual, solid stuff. I hope he may continue his researches into more dangerous fields, for I am one who believes there are important findings to be made where gross neurological disorder is not present.

Without "the will to believe" (I hope) I have recently submitted six specimens of handwriting to a so-called "graphologist." She holds an important position in the American Institute of Grapho-Analysis. All identification data were deleted from the letters sent. Here are my estimates of her analyses, compared with full medical and psychological records in my possession.

Specimen	Analysis Per Cent
A killer in death row at San Quentin	20
A radio personality; alcoholic, unadjusted	95
A woman, homosexual, artist, taking drugs to alleviate distress of larynx carcinoma	85
A dramatic editor of a newspaper, three days before committing suicide	70
A paranoid praecox, killer, residing in State Hospital	80
A member of the California Medical Association Council	90

Average estimate, 73 per cent.

This "analyst" has for years read handwriting for the National Board of Fire Underwriters; their general manager wrote her during March, 1938: "Received analyses, and we find them, as usual, 100 per cent correct." I report this only to suggest that before final "yes" or "no" may be given to the value of "graphology," it would be well to take a thousand specimens of norms, psychotics, neurotics, etc. Eliminate all identification data; have competent persons take clinical records to which numbers have been assigned, and make cold comparisons with "analysts" reports, and . . .

Back to earth! Content of manuscript, time, and lineage factors are important and must be understood. Quinan (I have seen his blind approach to final analysis of data) picked out the executives, small department heads, and men in lower positions on police force and in industry by time and lineage readings of the test written sentence, "He protested that he couldn't eat the twenty-two tarts; and the truth is that he ate twenty." Quinan, again, found that the crossed types (one eye dominant and the heterolateral hand being used for writing) were present in much higher percentages in speeders, reckless drivers, dementia praecox, constitutional psychopathy, artists, musicians, and preachers.

THE NUTRITIONAL PROBLEM IN TOXEMIAS OF CONTAGIOUS DISEASES*

By MILTON TOBIAS, M.D.
Los Angeles

DISCUSSION *by John C. Ruddock, M.D., Los Angeles; Albert G. Bower, M.D., Hollywood; George M. Stevens, M.D., Los Angeles.*

IN toxemias, accompanying contagious diseases, the dietary regimen is too often a casual addendum to a carefully planned treatment. Fluids are forced; glucose is introduced parenterally in conjunction with a high carbohydrate, a maintenance or low protein, and an abundant vitamin intake. We challenge the competency of such generalities; in their stead, we suggest the physiological determination of metabolic needs and of gastro-intestinal misbehavior.

In disease, as in health, nutrition is correct and its balance is positive when all requirements for maintenance and growth are fulfilled. These requirements are established by the unique physical, chemical, and energy phenomena peculiar to the current metabolic situation. Conditioned by an increased metabolic rate, by an increased catabolic activity (cellular wear and tear), the previously positive becomes a negative metabolic balance. To paraphrase, "The metabolic balance is in the red." The toxic patient must have correspondingly abnormal and augmented nutritional demands. These increased demands, ordinarily, are satisfied by reserve depots whose sufficiency makes autogenous convalescence possible.

NUCLEOPROTEINS AND PHOSPHOLIPIDS

From the manifold ramifications of the nutritional problem in toxemias, the inclusion of abundant nucleoproteins and phospholipids was selected for clinical study. Insulin administration was included in our procedure.

A schematic discussion of both cell and liver will make our hypothesis more intelligible. The vital structure of every cell is a colloidal system in which nucleoproteins and phospholipids participate.[1-4] The source of energy for cellular activity is primarily the utilization of glycogen; and the control of cellular behavior is affected by the interchange of substances with its immediate environment. There occurs, in nice equilibrium, a constant flux of electrolytes, hormones, enzymes, and nutritional elements to and from the cell. The introduction of any toxic irritant into this extracellular medium, disturbs protoplasmic chemistry; interferes with the precise mechanism of cellular function; provokes cellular sacrifice; and, commensurately, destroys nucleoproteins and phospholipids.[5,6] Since the nucleoprotein and phospholipid content of normal tissue is fairly constant,[7] their increased destruction should necessitate a compensatorily increased intake, replacement sufficient to convert their negative into a positive balance.[8]

The liver, like all body tissues, is probably profoundly and unfavorably influenced by a severe

* Read before the General Medicine Section of the California Medical Association at the sixty-sixth annual session, Del Monte, May 2–6, 1937.

toxemia.[13] Its normal complex activities, consequently, are altered. Such impaired function disturbs its metabolic responsibility in isolating unsaturated fatty acids from the blood stream; in synthesizing phospholipids and supplying them to the body tissues at need;[8] in regulating glycogen metabolism;[13] in preparing amino-acids and other nutritional elements for subsequent utilization in the body tissues.

During a toxemia the increased tissue requirement for phospholipids and nucleoproteins constitutes a correspondingly increased demand upon this already dysfunctioning liver.[9] It is relevant that the most constant postmortem finding in toxemias is fatty infiltration of the liver. Such fatty infiltration suggests a causative alteration in the function of liver cells related, possibly, to a deficiency in lecithin (a phospholipid), or in cholin (an amin incorporated in lecithin).[14]

A strikingly similar fatty liver was described by Hershey and Soskins in depancreatized dogs that died with symptoms of liver failure.[10] By lecithin feeding, one dog remained alive two and one-half years, to die later of a terminal illness unrelated to any failure of liver function.[11] The addition of lecithin to the diet of these diabetic animals alleviated frequent critical episodes characterized by signs of liver failure. Fatty infiltration in the liver was produced, also, by the feeding of small quantities of cholesterol, and was prevented by the addition of cholin[12] (an amin incorporated in lecithin). This experimental data suggests that phospholipid intake may play a considerable rôle in preventing an abnormal deposition of neutral fat in the liver; a fatty infiltration analogous to that seen in toxemias.

From the preceding discussion we may imply—to be adequate—nutrition for the toxic patient must provide an ample phospholipid and nucleoprotein intake.

Time and text prevent the discussion of additional factors such as ferments, vitamins, activators, and catalysts.

CLINICAL MATERIAL OF THE STUDY

Nucleoproteins, phospholipids, and insulin administration were, for the first time, deliberately included in the nutrition of a toxemia in the case of V. P., age twenty months, admitted into the California Hospital on January 1, 1930, and discharged on January 19 of the same year. The diagnosis was severe acrodynia. Despite the application of every then known therapeutic measure, her clinical career included progressively increasing anorexia, muscular hypotonicity, cold beefy hands, loose teeth, repeated eruptions and conjunctivitis. On admission, her condition was critical, semi-comatose, and gavage was necessary. The diet prescribed contained liver 50 grams, brain 15 grams, two egg yolks, and represented 5 grams of lecithin; four units of insulin were administered three times daily. On her seventh hospital day, she ate voluntarily, sat erect, attempted to walk, and stopped pulling out her hair. The patient was discharged on her eighteenth hospital day, happy, walking, and eating without coercion.

Unusually toxic children were chosen as subjects for our investigation. Included in this series were septic scarlet fever with complications, bull-neck diphtheria, universal erysipelas during infancy, septicemia, sepsis of undetermined origin, nephrosis, pertussis pneumonia in infancy, and severe typhoid fever. In aggregate, according to our experience, such entities have an approximate mortality rate of 30 per cent.

Since 1931 one hundred such patients have received a soft high carbohydrate, high vitamin diet, rich in nucleoproteins and phospholipids. In this group rather dramatic clinical improvement was not uncommon, but the most consistent response to our procedure was the one most difficult to record—the intangible factor, a beneficent change in clinical personality. Regardless of etiology or complications, however, such nutritional tactics were at no time injurious. Our mortality rate was 8 per cent.

Three case reports have been selected from the above series to describe the illness treated, the dietary regimen instituted, and the clinical response obtained.

REPORT OF CASES

CASE 1.—D. B., seven years old, admitted on July 15, 1935; discharged on July 30, 1935. Diagnosis: Nephrosis.

The patient, on admission, had an edema involving the lower abdomen and extremities, and a brownish area of discoloration extending from the right labia majora to the right thigh. Her blood pressure was 95/70; temperature was 103 degrees. Many fine granular and hyaline casts; two plus albumin and many pus cells were found in the urine. Blood chemistry was the following: NPN 27, cholesterol 222, NaCl 495, serum albumin 1.5, serum globulin 2.1. The edema spread over the face and entire body. On July 18, 100 grams of liver, 6 egg yolks, 5 cubic centimeters of bioplastina intramuscularly, and 5 units of insulin three times daily, were included in her regimen. Two days later, on July 20, her fluid intake was 350 cubic centimeters and the output 850 cubic centimeters. The patient's blood chemistry on the following day was: NPN 27, NaCl 412, cholesterol 278, serum albumin 2.4, serum globulin 2.3. An uneventful recovery ensued, and she was discharged as cured on July 20, 1935.

* * *

CASE 2.—E. C., five months old, admitted on March 29, 1935; discharged on April 14, 1935. Diagnosis: Erysipelas.

On admission, after twelve days' illness, the patient was extremely toxic, had a temperature of 105 degrees, neck was rigid, and the erysipelas extended from the back of the neck over both shoulders anteriorly to the clavicle. Despite continuous cold magnesium sulphate compresses, antitoxin, and daily introduction of intramuscular blood, the erysipelas, now edematous and vesicular, descended below the navel to the buttocks, and included the upper extremities and the entire back. The patient's temperature varied between 104 and 105 degrees, and her condition was critical. On April 7, 1935, we added 60 grams of liver, 6 egg yolks, 5 cubic centimeters of bioplastina, and 5 units of insuin three times daily to her regimen. Two days later her temperature was normal and the erysipelas subsequently rapidly disappeared. She was discharged as cured on April 14, 1935.

* * *

CASE 3.—D. W., seven and one-half years of age, admitted on July 6, 1933; discharged on September 12, 1933.

Prior to admission, the patient had a sore throat for a week; scanty urine for two days, swelling of face for two days. On admission, his skin was desquamating; cervical adenopathy and a raspberry tongue were found; blood pressure was 142/90; one plus albumin was determined on urine examination; NPN was 68 and creatin was 1.5. The diagnosis of postscarlet nephritis was made, and a nephritic low protein, low salt diet was prescribed. Five hundred

cubic centimeters of 10 per cent glucose were administered intravenously twice daily, to be replaced on July 15 by 50 cubic centimeters of a 50 per cent solution twice daily.

On July 12, six days after admission, his rather placid course became suddenly critical with all findings of acute myocardial failure. Streptococcus hemolyticus was isolated on blood culture. The patient's condition remained critical, and on July 21, the urine was smoky-red and petechiae were observed. His treatment, during this period, included stimulants, daily intramuscular blood injections and intravenous glucose. The introduction of 70 cubic centimeters of blood intravenously was followed one hour later by severe cramp-like precordial pains, vomiting, weak fluctuating pulse with a rate of 200. On August 6, the right arm and leg became paralyzed. All preceding therapy was discontinued on August 8, and to his dietary regimen were added 100 grams of liver, 8 egg yolks, 5 units of insulin three times daily, and 5 cubic centimeters of bioplastina intramuscularly.

Between August 9 and date of discharge the patient's temperature, pulse, and respiration were normal, with few exceptions; urine examination and blood chemistry was, likewise, normal; his hemiplegia and general condition were much improved.

COMMENT

Good nutrition, satisfactory immunological response to disease, and a positive nutritional balance are inseparable. With the advent of a toxemia, catabolic cellular activity surmounts the anabolic, and the nutritional balance, positive during eutrophy, becomes negative. To promote optimum cellular behavior in the toxic patient, we must provide a nutritional intake compatible with the now altered, the peculiar, physical, chemical and energy phenomena. The interpretation of physiological data described suggests a deficiency in nucleoproteins and phospholipids. These substances were added to the orthodox regimen of heterogeneous toxemias.

Liver was selected as the source of proteins. Its content in lipoprotein and other factors, many as yet undetermined, were considered essential for normal metabolism and for adequate gastro-intestinal function. Phospholipids were administered enterally, as egg yolks, and parenterally, as bioplastina (Serono).

Insulin was found clinically of advantage, and with its administration gastro-intestinal behavior appeared more sufficient. Three cases were described, and they portray the clinical response frequently obtained.

SUMMARY

1. Clinical experience suggests the probable value of nucleoproteins, phospholipids, and insulin, as adjuncts to orthodox therapy in severe toxemias.

2. The results obtained in one hundred cases, reviewed with circumspection, suggest that the frequent coincidence of clinical improvement is no therapeutic mirage.

3. The mortality rate was reduced from 30 to 8 per cent.

4. The improvement so elicited justifies additional experimentation—an intimate contemporary collaboration between internist and physiologist.

1052 West Sixth Street.

REFERENCES

1. Lespeschkin: Kolloidalchemie des Protoplasm, p. 145. Springer, 1924.
2. Leathes, J. B.: Lancet, Vol. 1, No. 1019, pp. 803, 957, 1925.
3. Mayer, A., and Schaeffer, G.: J. de physiol. et de path. gen., 16:325, 344, 1914.
4. Sinclair, R. G.: Physiol. Rev., 14:351, 1914.
5. *Ibid.*
6. Bloor, W. R.: J. Biol. Chem., 72:327, 1927.
7. Bloor, W. R.: J. Biol. Chem., 67:33, 1926; J. Biol. Chem., 80:443, 1928.
8. Sinclair, R. G.: Physiol. Rev., Vol. 14, 1924.
9. Monaghan, J. Biol. Chem., Vol. 98, 1932.
10. Hershey and Soskins: Am. J. Physiol., 98:74, 1931.
11. Best, C. H., and Hershey: J. Physiol., Vol. 75 (May 30, Aug. 10), 1932.
12. Best, C. H., and Ridout: J. Physiol., 78:415, 1933.
13. Soskins: Am. J. Physiol., 112:649-656 (Aug.), 1935.
14. Best et al.: J. Physiol., 86:315-322 (March 9), 1936.

DISCUSSION

JOHN C. RUDDOCK, M.D. (1930 Wilshire Boulevard, Los Angeles).—"There is no panacea for all ills," although one may be led to believe that this is so after reading the case reports by Doctor Tobias in the treatment of toxemias. However, I do not believe that even he needs to intimate that nutritional disturbances when corrected are the panacea for toxemias. It is my opinion that Doctor Tobias has brought to our attention in this paper certain facts which we all know but which we often neglect. Custom has caused us to apply formulas for the dietary treatment of toxic patients. Too often all we do is force fluids and load the patient up with intravenous glucose. Doctor Tobias has brought out the fact that a close coöperation between the internist and the physiologist is necessary. He has shown how it is possible to supply the physiological needs of the patient when the metabolism of that patient has been upset by toxin. His series is small but his results are good, and it devolves upon us all to give his methods a trial in the treatment of our toxic patients.

*

ALBERT G. BOWER, M.D. (6777 Hollywood Boulevard, Hollywood).—While some advance is to be anticipated in future in the treatment of the acute infectious diseases by yet undiscovered specific agents, or by the coming into more general usage of factors already established but not generally available, it would appear to the clinician, who has seen many thousands of such cases, that the most urgent need at present unfulfilled in their care is for a more forward-looking handling of the involved problems of nutrition.

When scarlet fever cases began to be handled early in the disease with sweetened beverages, and little else, there was a marked lessening of the incidence of kidney involvment formerly observed. However, due to its too long continuance, and the lack of consideration of the additional factors involved, other sequelae appeared. If convalescence were successfully achieved, the patient was usually exhausted, in a poor state of nutrition and resistance, and had lost considerable weight. Under the program outlined by Doctor Tobias, mitigation of the above conditions has been pronounced.

What has been said about scarlet fever applies equally well to the other continued fevers. The change in the dietary regimen of typhoid fever, with its attendant benefit, over the past three decades is at present so well known as hardly to merit comment.

The next great advance in the handling of these diseases must result from an understanding and fulfillment of their metabolic requirements and the coöperative teamwork of the physiologist, the biochemist, the clinician, the dietitian, and the hospital director. The surface has hardly been scratched in such investigation, and from observation of the results achieved from the small beginnings so far noted, when it becomes a more intelligible and living part of our armamentarium, many lives will be saved that otherwise would be lost.

To save these lives we shall have to have enthusiastic, tireless and painstaking clinicians who approach each case as an individual nutritional problem. Also, we shall have to throw overboard the present standardized hospital diets and soft-pedal the clamor originating in the finance departments of hospitals regarding the economic phase of greatly increased costs.

I hope Doctor Tobias' paper will stimulate others to assist in blazing new trails into this more or less unexplored field, and that they may be persuaded to report their results and progress from year to year.

❦

GEORGE M. STEVENS, M.D. (Epidemiologist, Los Angeles City Health Department, Los Angeles).—The subject discussed by Doctor Tobias is of vital importance in the management of the acute infectious diseases. The principles cited need not necessarily be confined to pediatrics, but readily lend themselves to similar conditions in the adolescent and older age groups.

The author's theoretical aspect of this subject has a sound physiological basis. He has succinctly summarized his principles of successful management by stating that "the nutrition for the toxic patient must provide an ample phospholipid and nucleoprotein intake." During my many years of service at the Communicable Disease Unit of the Los Angeles County Hospital it has been my privilege to have witnessed these principles applied to practical use. The results have been most gratifying. The principles of dietetics are often confusing. Frequently we continue with our regimen of therapeutic and dietetic management solely on the basis of precedent, and not on sound physiological knowledge. I have observed many patients who had received adequate specific medication but who clinically continued to retrogress. This, despite the fact that their diets were presumed to be adequate. Subsequently, the principles advocated by Doctor Tobias were instituted and, much to my surprise and pleasure, I noted many a dramatic and rapid convalescence, which terminated in complete clinical recovery.

I cannot overemphasize the correlation as to the value of good nutrition based on the principles of modern-day physiology and medication. These factors are essential for the satisfactory immunological response of the patient to the toxemias of the acute infections. The two are closely interwoven and are of equal importance. The principles evaluated in this article are readily applicable to our every-day practice with the most encouraging clinical results.

MAXILLARY SINUS IRRIGATION THROUGH THE OSTIA*

WITH ANATOMICAL AND CLINICAL DEMONSTRATIONS

By CHARLES E. FUTCH, M.D.
Los Angeles

DISCUSSION *by Jay Randolph Sharpsteen, M.D., Oakland; Rea E. Ashley, M.D., San Francisco; Ben L. Bryant, M.D., Los Angeles.*

NATHANIEL HIGHMORE,[1] in 1651, described a suppurative disease of the nasal accessory sinus which bears his name. Since Highmore there have been innumerable treatises upon the anatomy and pathology of the maxillary sinus. Today the fundamentals of diagnosis and treatment are based upon a consideration of the work of these past teachers.

Irrigation of the maxillary sinus has long been an established procedure in diagnosis and treatment. Five methods of irrigation are recognized: (1) Cowper's[2] method; (2) approach by way of the canine fossa; (3) puncture of the middle meatus; (4) puncture of the inferior meatus; (5) cannulization of the ostia of the middle meatus. These methods are all familiar to rhinologists. This discussion, however, will be limited to irrigation by way of the ostia of the maxillary sinus. While this method is now widely used, some rhinologists may not have experienced the advantages of this approach without puncture.

HISTORY

Jourdain,[3] a dentist of Bordeaux in 1765, is said to have been the first to use the approach to the maxillary sinus through the middle meatus. The shape of the instrument used by Jourdain indicates strongly that the membrane of the middle meatus was punctured. Although the patient was relieved by this procedure, Jourdain[3] and his method were condemned as dangerous and unsafe by the French Council of Medicine. Stoerk,[4] as early as 1886, preferred the ostium technique to the then newly introduced puncture through the inferior meatus. Hartmann[5] also endorsed this method, and was able to irrigate twenty-three out of thirty-two maxillary sinuses with this approach.

LITERATURE

The literature of more recent years shows a wide variance of opinion by rhinologists of wide clinical experience. Favoring this approach, Meyerson[6] stated: "It would appear from this study that irrigation of the maxillary sinus through its ostium is a feasible procedure, in a sufficiently large percentage of cases, to make it worthy of a trial." Dintenfass,[7] likewise, states that "in the diagnosis of disease of the maxillary antrum, ostial catheterization should always be attempted before resorting to the puncture of the inferior meatus."

On the contrary, Ross Skillern[8] does not think that this method is practical, and Mosher,[9] in 1929, said: "It is difficult, if not impossible, in the majority of cases to catheterize the ostium of the antrum. From the surgical standpoint, however, this makes but little difference, because it is easy to break into the antrum near the ostium through the membranous area in which the ostium is placed." Also supporting the negative view, Sieur and Jacob[10] stated that "since the ostium opens into the lowermost portion of the infundibulum, one must agree with Zuckerkandl that 'it is entirely superfluous to tire oneself in sounding it.'" The use of the ostia for cannulization of the maxillary sinus must have some value to have merited so much consideration. The fact that the views are controversial should stimulate to further study of this problem.

ANATOMY

A review of the anatomy of the middle meatus will clarify the possibilities of approach through the natural or accessory ostia. Under the middle turbinate, anteriorly and below, there is the uncinate process, which forms the anterior inferior lip of the hiatus semilunaris. The superior posterior lip of the hiatus is formed by the bulla ethmoidalis. The divergence of these two structures, the bulla ethmoidalis and the hiatus semilunaris, is the bullo-uncinate angle. The infundibulum is the groove bounded by the hiatus semilunaris, bulla ethmoidalis and the bullo-uncinate angle posteriorly.

In this series of twenty dissections, accessory ostia were found in approximately 30 per cent.

---

* Read before the Eye, Ear, Nose and Throat Section of the California Medical Association at the sixty-sixth annual session, Del Monte, May 2–6, 1937.